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DESCRIPTION OF BUILDINGS, FIXED EQUIPMENT AND SERVICES OF THE REGIONAL RESEARCH LABORATORIES [1]

Four Regional Research Laboratories have been built by the United States Department of Agriculture. They are known as the Northern, Southern, Eastern, and Western Regional Research Laboratories, and are located at Peoria, Illinois; New Orleans, Louisiana; Wyndmoor (Philadelphia), Pennsylvania; and Albany, California, respectively. The program of research for these laboratories is directed toward the discovery and development of new and wider uses, and extended markets, for agricultural commodities and their products and byproducts.

BUILDINGS

The main buildings of the Regional Research Laboratories are all essentially U-shaped structures, each of which consists of three stories and basement and are divided into an Administrative Unit forming the front or base of the U, a Chemical Laboratory Wing for the research laboratories, and an Industrial Laboratory (Pilot Plant) Wing primarily for semiplant-scale process development. (See figure 1.) There is an attic and penthouse over the Chemical Laboratory Wing and Administrative Unit and that part of the Industrial Laboratory Wing devoted to laboratories.

The buildings are of reinforced concrete-frame construction except for the part of the Industrial Laboratory Wing devoted to process development, which is framed of structural steel. The floor slabs are of the flat arch type, poured with smooth forms, making furred or plastered ceilings unnecessary.

The air-conditioned laboratories are provided with double sash, the outer sash being of steel (projected type) and the inner sash of wood (single sash with storm-sash hangings). At all laboratories the outer sash are glazed with heat-absorbing glass on the sun exposures. The windows in the Industrial Laboratory Wing are glazed with 1/8-inch ribbed glass. A maximum number of windows has been provided in the Chemical Laboratory Wing. (See figure 2.)

There is ample space for parking automobiles on the grounds.

Administrative Unit. This Unit houses, in the basement level, the chemical stores and includes most of the service shops, as well as air-conditioning units and some building services. Most of the Unit, however, is devoted to division and administrative offices. In addition to these offices, a library, exhibit room, and emergency room are on the first floor, and an assembly room, a glassblowing shop, and rooms for photography, photostating, and blueprinting are on the third floor.

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[1] Supersedes ACE-33 by R. L. Hanson

Chemical Laboratory Wing. Three floors of standard laboratories are located in this Wing. The plan is based on a unit of three 16'x24' rooms; the two outer rooms are standard laboratories with complete facilities; the center room is divided by removable partitions into two office-studies and a utility room, and without the partitions, is a potential laboratory. Figure 2 illustrates the arrangement. The utility room may be devoted to any special use, such as constant-temperature, special-equipment, or dark room. The basement of the Chemical Laboratory Wing has, in addition to air-conditioning units and transformer vault, a receiving room, and provision for future cold-storage rooms, and other special rooms, such as for sample storage and sample preparation. Effort was made to eliminate heavy processing equipment from this Wing in order to prevent vibration of the building. The refrigeration machinery is mounted on island footings or with special dampening mountings. The Chemical Laboratory Wing has been arranged to allow the work requiring greatest freedom from vibration to be located on the first floor.

Industrial Laboratory Wing. This Wing, except the small part devoted to standard laboratories, is of steel-frame construction with free-standing columns along both sides of the Wing running up to frame a monitor overhead. These columns are connected to the outer wall structure at the second floor level with permanent steel members. These members support a balcony floor along each side of the building. Alternate sections of these balconies are bolted instead of riveted and may be raised or lowered to any desired level. The piped services are carried in a U along the inner face of the columns near the second-floor level. The electric power is supplied from a box-bus conduit circling the wing at the outer wall near the first-floor level. The entire area available for process development is amply provided with floor drains and special plugged drain connections. Part of the ground-floor level is occupied by service shops. The deck over these shops is constructed heavily enough to serve as additional Industrial Laboratory floor space. Provision is made for additional working levels by framing with unit steel. With the exception of the Southern Regional Laboratory at New Orleans, a few standard laboratories are provided at three levels in the Industrial Laboratory Wing next to the Administrative Unit, for the purpose of housing control and research work directly associated with process development.

Service Building. This is a separate Building and is located a short distance from the laboratory building. It provides steam for processing and heating and, in three of the Regional Laboratories, chilled water for summer air-conditioning.

Solvent-Storage Building. This small building is located in semi-isolation to provide safe storage for bulk flammable solvents.

BUILDING SERVICES

The first, second, and third floors of both the Chemical Laboratory Wing and Administrative Unit, except in the Western Regional Laboratory at Albany, California, are air-conditioned with year-around control. The universal air-conditioning is by a split system with zone units. At the Western Laboratory, room-ventilating (without cooling) units that draw fresh air from beneath the windows are provided in each bay.

Throughout the Chemical Laboratory Wing and the standard laboratories in the Industrial Laboratory Wing, the services are carried to the various rooms by drop risers in shafts lining both sides of the corridor. These shafts are so arranged that, in addition to the vertical pipe lines, installed laterals may be run from shaft to shaft around enclosed columns or through furred enclosures over the entrances to the laboratories. This use of laterals is not recommended where risers can be used.

Both Wings are supplied with the following services:

1. Cold water at approximately 35 pounds static pressure at third-floor level.

2. Compressed air at 60-100 pounds.

3. Gas - local utility.

4. Electricity - three phase - four-wire system, 120 and 208 volts, 60-cycle.

Process steam at nominally 15 pounds is supplied to the Chemical Laboratory Wing and at 125 pounds, to the Industrial Laboratory Wing.

Vacuum service is supplied to the Chemical Laboratory Wing from a two-stage steam-ejector pump with barometric condenser to provide a vacuum of nominally 1 inch of mercury absolute pressure.

Recirculating hot water at 150° F. is provided for the Chemical Laboratory Wing and Administrative Unit.

Distilled water is piped by gravity to all laboratories. The still, storage tank, and distributing system are lined with block tin.

Passenger and freight elevators are located at the turn of the corridor in the Administrative Unit near the Chemical Laboratory Wing. An electric dumb-waiter across the corridor from the freight elevator serves the chemical and apparatus storeroom in the basement and the library on the first floor, and is open to the corridor at all floors.

The following Shops are located in the basement of the Administrative Unit and in the adjacent end of the Industrial Laboratory Wing: Woodworking, Plumbing, Machine, Instrument, Sheet Metal, Electrical, and Paint.

In the basement of the Chemical Laboratory Wing provision is made for physical testing, constant temperature, and cold storage rooms to be used for certain temperatures desired at each Laboratory.

LABORATORY ROOM SERVICES AND EQUIPMENT

The standard research laboratory is planned to provide working space for two chemists with office-study adjacent. The equipment of two standard laboratories is outlined in figure 2. Because the selection of construction materials for laboratory furnishings was determined by the degree of economy necessary, as well as by the nature of the work, and because under particular limitations different selections were still possible, no special attempt has been made to identify such materials in the following descriptions.

The wall and center benches are made up of standard-sized sections and interchangeable end members, with all cabinet inserts interchangeable except at the dump sinks. There are usually three styles of interchangeable inserts. The bench tops and reagent shelves are spliced at section lines. Each bench section is 41 inches long between end-frame centers and all benches are assembled in multiples of 41 inches. The reagent shelf is directly above the turret and service outlets at the rear of the working surface. Each bench section carries a full complement of services arranged in the following order: cold water over cup sink, compressed air, single-phase alternating current, vacuum, and gas. The air service, located next to the cup sink, provides for substitution of steam if desired. Air, gas, and vacuum services terminate in heavy-duty plug cocks with long handles. All services are identified by color. Only cold water is provided at the dump sinks, with three outlets, two of which are suitable for aspirator pumps. Reagent cabinets with sliding glass doors are provided on the reagent shelf over the wall bench in some of the laboratories.

The fume hood is designed to operate in air-conditioned laboratories with provision for sweeping the hood in closed operation without waste of room atmosphere. The working surface is of heavy soapstone without built-in steam bath. The structure is of acid-resistant material enclosed by vertical panels reaching to the ceiling. In closed operation waste air from the air-conditioning system is provided under slight pressure and delivered to the hood chamber through slots in column ducts at either side of the hood sash. This air supply is turned on or off automatically through the opening and closing of the hood sash. The chemist is only responsible for the operation of the control damper in the exhaust line, as it is sometimes necessary to reduce the air flow for closed operation. Outlets for piped services are located inside of the hood in the back board below the lower fume slot. These services are controlled through needle valves with replaceable plugs and seats and remotecontrol handles on the apron of the hood. Steam and water outlets are located to dip or discharge directly into a cup sink. All electric services and controls come from a flush plate in the apron of the hoood. Except for service tip connections no metal is exposed within the hood chamber. The hood light is located in the top of the hood behind a glass panel and directed downward on the working surface. The base of the hood usually encloses cupboards; but in some cases, a steam drying cabinet. Each hood is served by an individual exhaust blower located in the penthouse.

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Apparatus or chemical storage cabinets at walls are in units 4 feet wide with open recessed shelf at bench level and sliding-door cupboards above and below. The doors of the upper sections are of glass.

No locks are provided on cabinets or cupboards except on one style of combination drawer-and-cupboard insert in the benches, one of which is assigned to each chemist and independently keyed.

The wash sink is of soapstone with all corners rounded and with integral drain board and box back. A peg board of moisture-resistant material extends the length of the sink. The height is such that persons of average stature can reach the top pegs. The services consist of a fixed-gooseneck mixing faucet and another gooseneck faucet for distilled water. Both faucets allow direct filling of 5-gallon stock bottles. Special sink mats prevent undue breakage of glassware. A safety shower with self-closing chain-operated valve is located above the end of the sink next to the doorway with the shower head directed obliquely downward.

A special cabinet is provided for the storage and transfer of strong acids. This cabinet is of wood or fiber with acid-resistant finish. Tellurium-lead-covered top and shelves carry beaded edges or splash boards. The assembly is accomplished without metal pinning.

A 4-foot balance table with soapstone top is located in the office study. This table has a drawer and a draw leaf and is large enough for analytical balance in dust case and for desiccator.

Above the single-pedestal desks in the office-study of most of the laboratories are special bookcase sections which furnish both book space and desk light without reducing the desk-top space. Other items of furnishings in the office-studies are shown in figure 2.

The laboratories are provided with small carbon-dioxide fire extinguishers at the doorways to the studies and to the corridors. Larger carbon-dioxide extinguishers are located in the corridors.

Artificial illumination of the laboratories is by semi-indirect lighting to provide 15 foot-candles on all working surfaces.

An individual electric panel in the wall of the pipe shaft on one side of the vestibule carries nine circuits to each laboratory. Sufficient power is available to supply 6 kw. to every laboratory room simultaneously. The conduit permits drawing leads to furnish 18 kw. at any one laboratory, The partitions dividing the laboratory rooms are either of tile or painted plaster on metal studding and lath. The floors are covered with linoleum. The laboratory color scheme largely comprises tones of green; no lead or iron pigments, which might react to produce discolored walls and ceilings, have been used.

Along the dividing partitions below the air-conditioning grill frames, a special heavy-gauge steel molding with projected vertical slot is mounted, locked to the partition, and plastered in. This molding is capable of supporting fairly heavy loads in the form of shelves or cupboards.

In order to provide safety exits, the doors between laboratories and laboratory studies are without locks or latches. Doors from laboratories to corridor are also without latches, although provision is made for key and turn lock. These doors open inward with push-plate on corridor side and pull-handle within room.

All piped services are carried from shafts to benches in laterals a few inches beneath the ceiling of the room below and up through sleeves into the benches. There are no risers in the laboratory rooms except those for heating-steam and condensate, which are located at the outer-wall columns.

The obvious impossibility of foreseeing specific future needs in any research laboratory made it necessary to provide as much as possible in the way of general flexibility and convenience. Although the Department of Agriculture previously had much experience in the way of laboratory construction, every effort was made to obtain further details concerning laboratory construction from others by visits to laboratories, by correspodence, or by conference. Some features within these new laboratories are innovations, which may, in turn, repay them for the valuable help they have supplied.

There are a number of special items of built-in laboratory equipment and furniture, but details concerning them would be out of place in this brief general description of the Regional Research Laboratories.

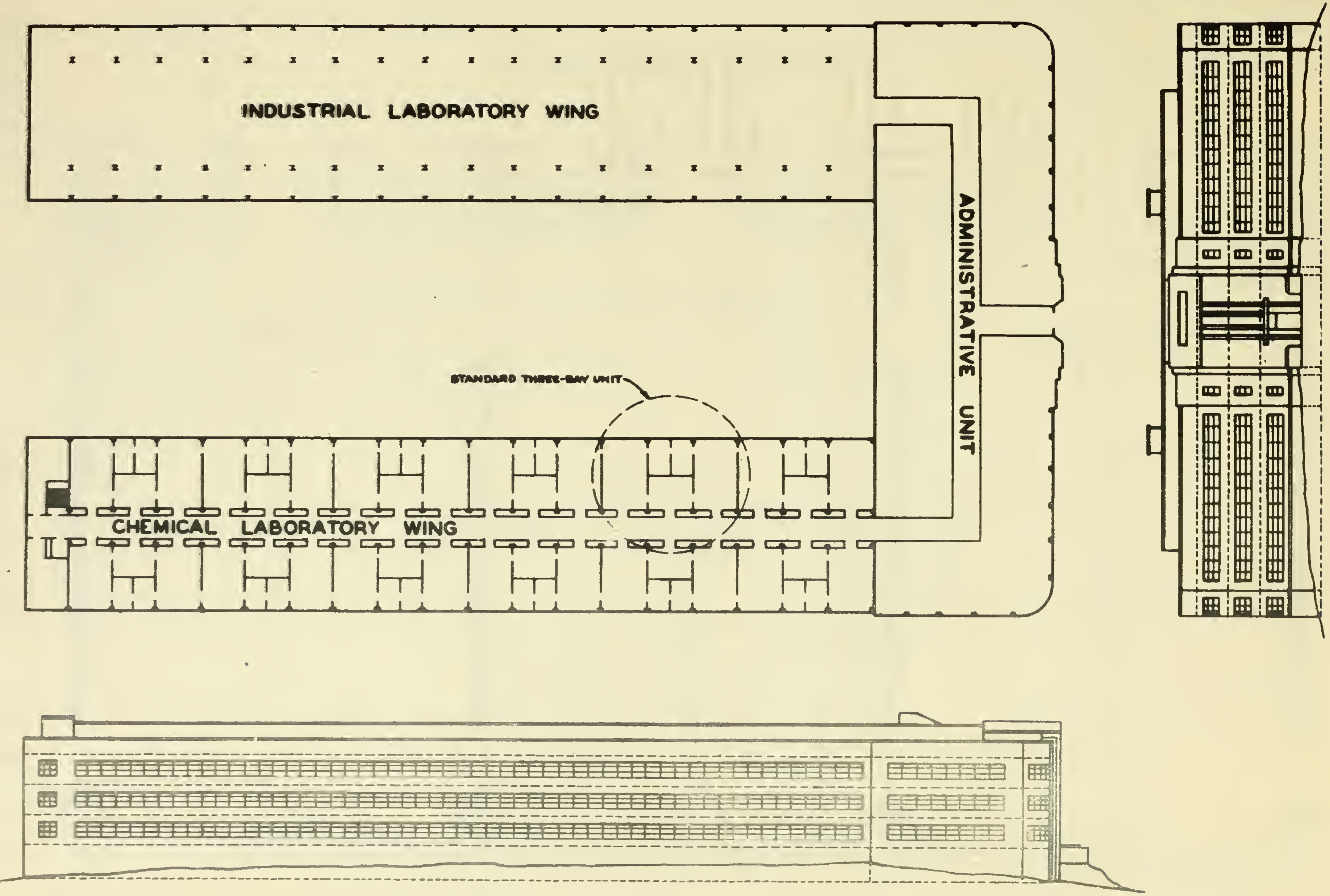

Figure I.— Regional Research Laboratory

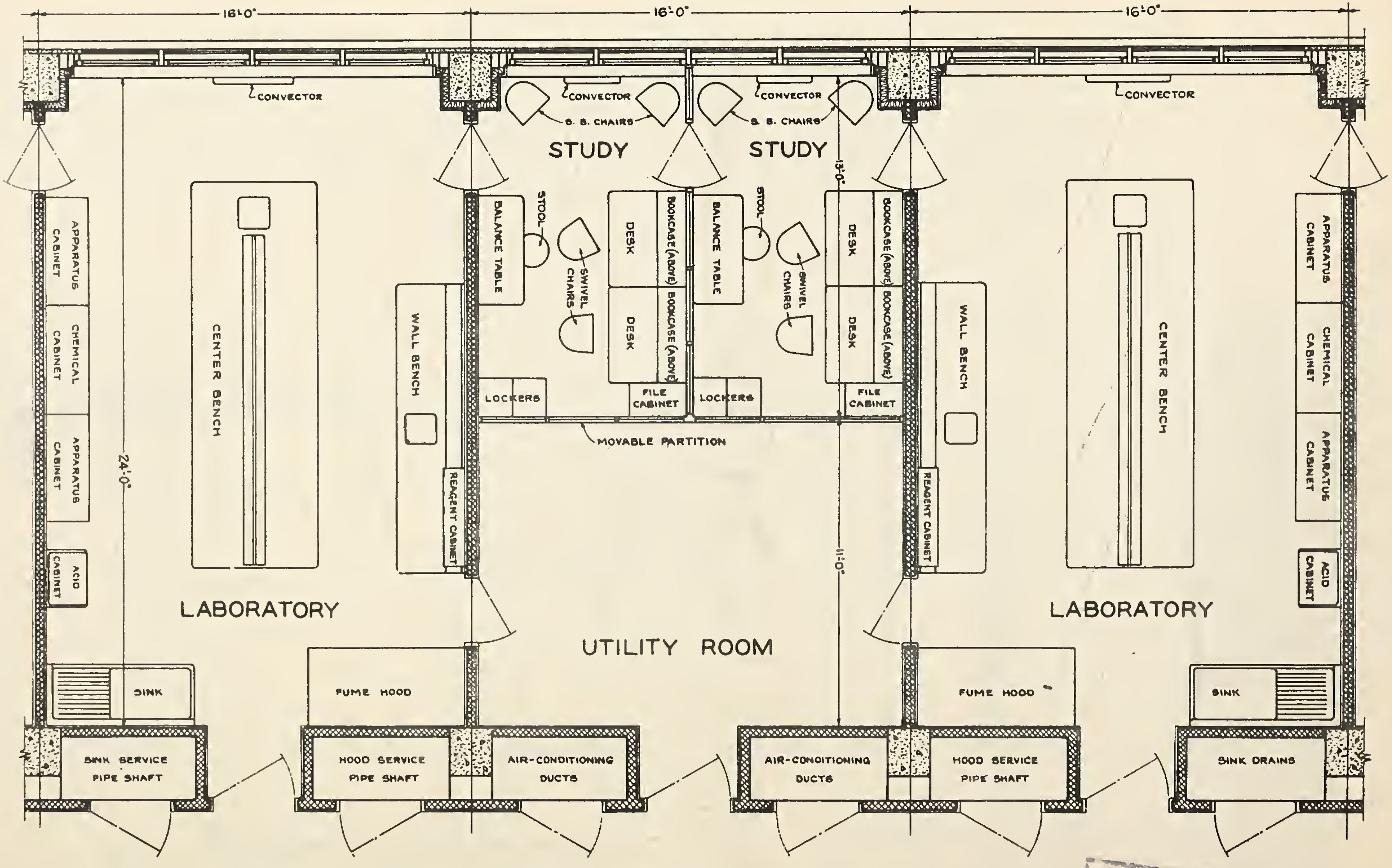

Figure 2.— Standard Three-Bay Unit

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